

**I CLAIM:**

1. A network monitoring system for monitoring the packet delivery performance of a packet-based network, the network comprising:

a first gateway device;

5 a second gateway device in communication with the first gateway device, wherein the first gateway and the second gateway communicate by transmitting a sequence of digital packets, the second gateway further comprising:

a control protocol process generating packet delivery performance statistics between the second gateway and the first gateway;

10 a network monitoring process for collecting packet delivery performance statistics between the first gateway and the second gateway; and

a database for storing packet delivery performance statistics according to gateway pairs.

15 2. The invention of claim 1 wherein a view of network performance is measured by compiling packet performance statistics between the first and second gateway devices.

3. The invention of claim 1 wherein the control protocol process generating packet delivery performance statistics utilizes RTCP.

20 4. The invention of claim 1 wherein the digital information packets contain real-time voice and audio information.

25 5. The invention of claim 1 further comprising a plurality of gateways generating network performance data; wherein the gateways are organized according to a hierarchical network organization structure to facilitate the organization of network performance data.

6. The invention of claim 5 wherein the network hierarchy comprises organizing individual gateway devices into groups for the purposes of collecting network packet delivery performance information according to the network hierarchy.

5        7. The invention of claim 1 wherein the packet delivery performance statistics comprise jitter and packet loss statistics.

8. The invention of claim 1 wherein the packet delivery performance statistics comprises round-trip delay statistics.

10

9. The invention of claim 1 wherein the network monitoring system comprises alarm processing for detecting when packet delivery performance statistic exceed alarm thresholds.

15

10. The invention of claim 1 wherein the network monitoring system comprises long term monitoring of detecting when packet delivery performance statistics.

11. A hierarchical network of gateway devices in a packet-based network to facilitate the transmission and organization of network packet delivery performance data, the network hierarchical structure, comprising:

20

a plurality of gateway devices constituting a zero hierarchy level wherein the gateway devices in a first group transmit network packet delivery performance data to a common network monitor; and

25

a second group of gateway devices constituting a first hierarchy level, the second group of gateway device comprising of a plurality of the first groups of the zero hierarchy level, wherein the common network monitors for the first group of gateway devices transmit network packet delivery performance data to a higher-level network monitor.

30

12. The invention of claim 11 further comprising:

a plurality of the first group of gateway devices collectively constituting a second grouping of gateway devices; and

a plurality of common network monitors, wherein each of the common network monitors one of the first group of gateway devices;  
wherein the common network monitors each transmit network performance data to a higher-level network monitor for that second grouping of gateway devices.

5

13. The invention of claim 12 further comprising a plurality of higher-level network monitors, wherein the higher-level network monitors transmit network performance data to another even higher-level network monitor.

10

14. The invention of claim 11 further comprising a plurality of common network monitors for a plurality of first group of devices, wherein each of the common network monitors receives network performance data from gateway devices within its particular first group of gateway devices.

15

15. The invention of claim 13 further comprising a plurality of common network monitors for a plurality of first group of devices, wherein the higher-level network monitor receives network performance data from a group of common network monitors.

20

16. A method for monitoring the performance of a network system comprising:  
generating packet delivery statistics for packets from a first gateway device to a second gateway device;

compiling packet delivery statistics generated from the first gateway to the second gateway at a monitor gateway; and

25

monitoring the packet delivery statistics at the monitor gateway to determine the packet delivery performance between the first gateway and the second gateway.

17. The method of claim 16 wherein the step of generating packet delivery statistics is generated according to the RTCP protocol.

18. The method of claim 16 wherein the step of compiling the network delivery statistics is performed with a database; wherein the database organizes packet delivery performance according to pairs of gateways.

5           19. The method of claim 16 wherein the step of monitoring the packet delivery statistics is performed at various time scales.

20. The method of claim 19 wherein the step of monitoring is performed on a time scale appropriate to real-time monitoring of call sessions.

10

21. The method of claim 19 wherein the step of monitoring is performed on a time scale appropriate to near real-time monitoring to provide current network conditions.

15

22. The method of claim 19 the step of monitoring is performed on a time scale appropriate to long-term trend analysis.

20